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"TRADER" SERVICE SHEET

851

ALLANDER A410

Covering A410A, B, C, the A400 Radiogram, the A430 Console and the A450 Chairside Model

UNIT construction is used for the chassis in the Allander A410A receiver, the R.F.-I.F. unit and the A.F.-power unit being bolted to front and rear members. The whole chassis is fairly "open" and accessible for service, and cast aluminium frames enable the assembly to be stood safely on any side, at the same time imparting rigidity to the structure.

The receiver is a 4-valve (plus rectifier) 3-band superhet designed to operate from A.C. mains of 200-250 V, 40-60 c/s. The differences in the A410B, A410C, A400 radiogram, A430 console and A450 "Chairside" model are explained overleaf under "Other Versions," but this *Service Sheet* was prepared from an A410A.

Release dates and original prices: A410 (all versions), April 1947, £23 2s; A400, July 1947, £73 10s; A430, October 1947, £34 13s.; A450, February, 1947, £45. Purchase tax is not included in these prices.

CIRCUIT DESCRIPTION

Aerial input is via coupling coils **L2** (S.W.), **L3** (M.W.) and **L4** (L.W.) to single-tuned circuits **L5, C32** (S.W.), **L6, C32** (M.W.) and **L7, C32** (L.W.). I.F. filtering by **L1, C1** across aerial-earth circuit.

First valve **(V1, Osram metallized X61M)** is a triode hexode operating as frequency changer with internal coupling. Triode oscillator anode coils **L11** (S.W.), **L12** (M.W.) and **L13** (L.W.) are tuned by **C38.** Parallel trimming by **C35** (S.W.) **C36** (M.W.) and **C10, C37** (L.W.); series tracking by **C7** (S.W.), **C8, C33** (M.W.) and **C9, C34** (L.W.). Inductive reaction coupling to control grid by coils **L8** (S.W.) **L9** (M.W.) and **L10** (L.W.).

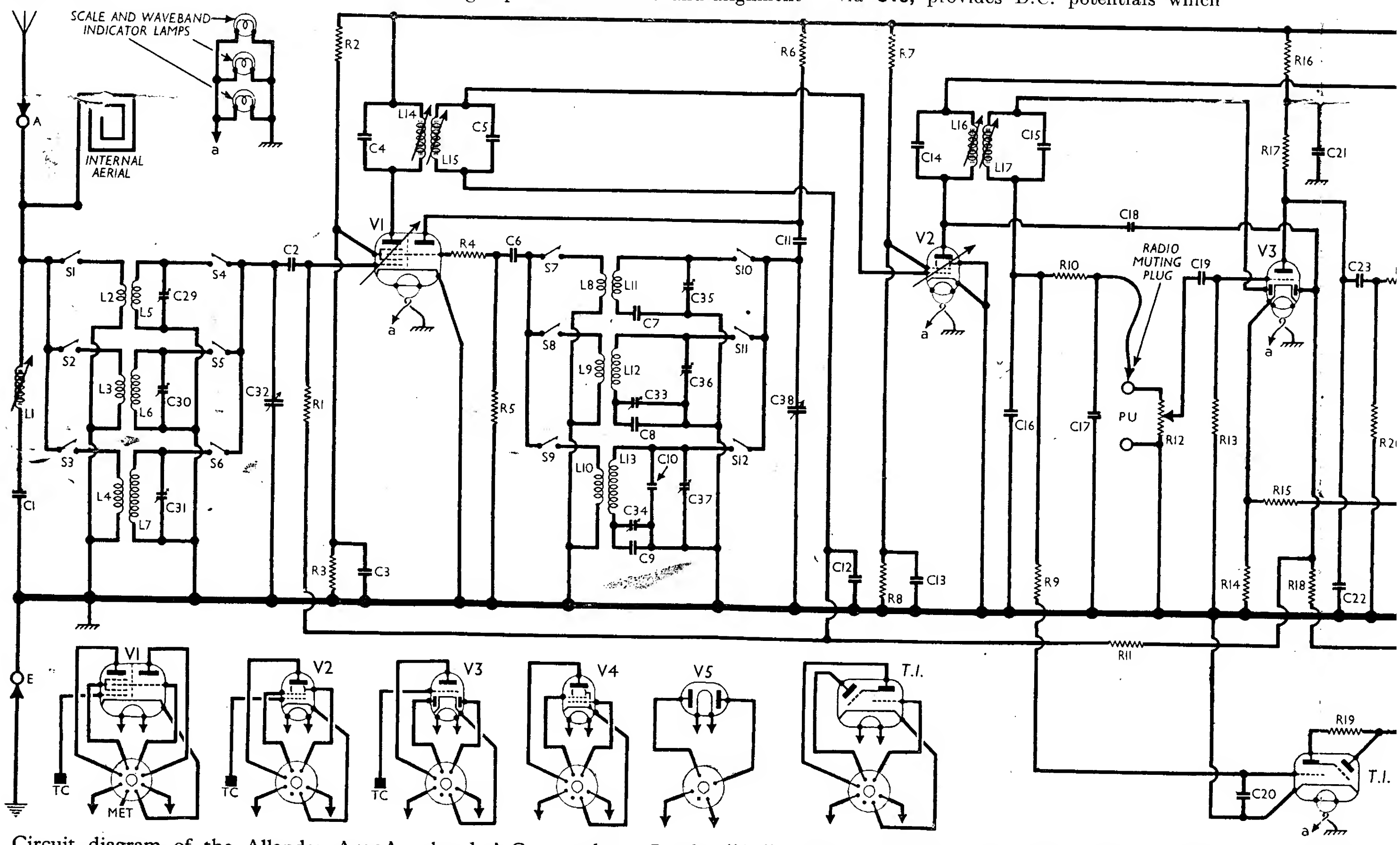
Second valve **(V2, Osram KTW61)** is a variable-mu R.F. tetrode operating as intermediate frequency amplifier with tuned transformer couplings **C4, L14, L15, C5** and **C14, L16, L17, C15,** in which the tuning capacitors are fixed and alignment adjustments are carried out by varying the positions of the iron-dust cores.

Intermediate frequency 465 kc/s.

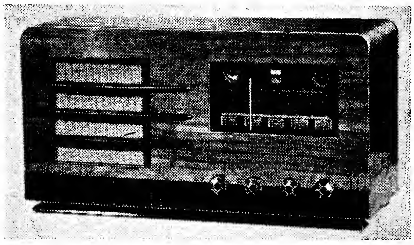
Diode second detector is part of double diode triode valve **(V3, Osram DH63).** Audio frequency component in rectified output is developed across manual volume control **R12,** which is also the diode load resistor, and passed via A.F. coupling capacitor **C19** and C.G. resistor **R13** to grid of triode section, which operates as A.F. amplifier. I.F. filtering by **C16, R10, C17** in diode circuit, and **C22** in triode anode circuit.

Provision for the connection of a gramophone pick-up across **R12,** when "radio" is muted by removal of the radio muting plug. The D.C. potential developed across **R10, R12** in series is applied, via a decoupling circuit, as control voltage to cathode ray tuning indicator **(T.I. Osram Y63).**

Second diode of **V3,** fed from **V2** anode via **C18,** provides D.C. potentials which



Circuit diagram of the Allander A410A 3-band A.C. superhet. In the "B" version, the H.T. smoothing choke is replaced by a resistor, w by the field coil of the speaker, which in this case is an energized type. In both "B" and "C" versions, the H.T. secondary voltage of t compensate for the increased resistance of the smoothing circuit.



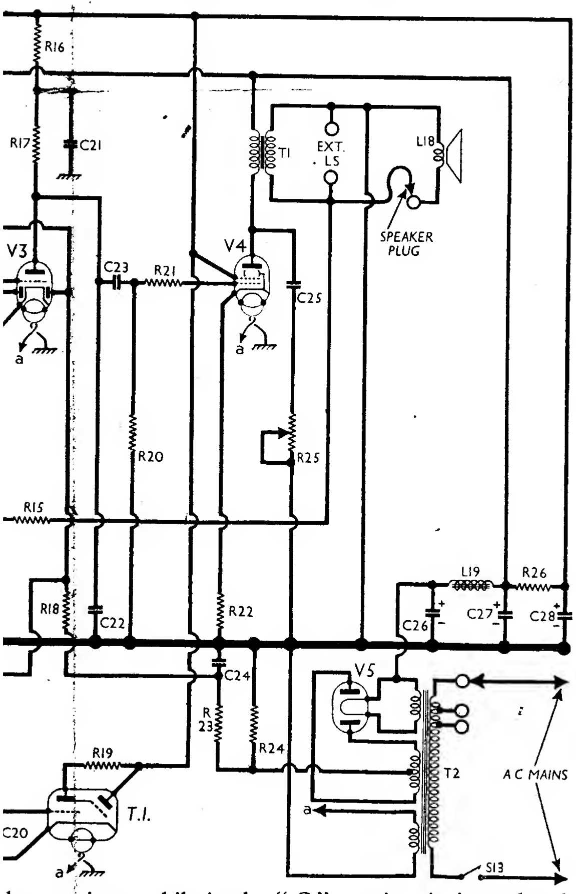
The Allander A410 receiver.

are developed across **R18** and fed back through a decoupling circuit as G.B. to F.C. and I.F. valves, giving A.V.C.

Resistance-capacitance coupling by **R17, C23, R20,** via grid stopper **R21,** between **V3** triode and beam tetrode output valve **(V4, Osram KT61),** with variable tone control in anode circuit by **C25, R25.**

Voltages appearing across the secondary winding of the output transformer **T1** are applied to **V3** cathode circuit, via the potential divider **R14, R15,** giving negative feed-back. Provision for the connection of a low-impedance external speaker across **T1** secondary.

H.T. current is supplied by full-wave rectifying valve **(V5, Osram U50).** Smoothing by iron-cored choke **L19,** resistor **R26,** and electrolytic capacitors **C26, C27, C28.** Fixed G.B. for **V1, V2** and A.V.C. delay voltage, is obtained from the drop across **R24** in the H.T. negative lead to chassis.



by a resistor, while in the " C " version it is replaced

ıry voltage of the mains transformer T2 is increased to

COMPONENTS AND VALUES

	CAPACITORS	Values (μF)	Location
C1	I.F. filter tuning ...	0·0001	J8
C2	V1 hex. C.G. ...	0·0001	A2
C3	V1 S.G. decoup. ...	0·05	H6
C4	1st I.F. transformer tuning ...	0·0001	A4
C5		0·0001	A4
C6	V1 osc. C.G. ...	0·0001	J6
C7	S.W. tracker ...	0·005	J7
C8	M.W. tracker ...	0·00055	J7
C9	L.W. tracker ...	0·0001	I7
C10	L.W. trimmer ...	0·00005	H7
C11	Osc. anode coup. ...	0·0001	I6
C12	A.V.C. decoupling	0·05	I8
C13	V2 S.G. decoup. ...	0·05	I8
C14	2nd I.F. trans-former tuning ...	0·0001	B4
C15		0·0001	B4
C16	I.F. by-passes ...	0·0001	H8
C17		0·0001	H8
C18	A.V.C. coupling ...	0·00005	I8
C19	A.F. coupling ...	0·01	H5
C20	T.I. C.G. decoup....	0·05	I8
C21	V3 H.T. decoup. ...	0·1	G6
C22	I.F. by-pass ...	0·0002	H8
C23	A.F. coupling ...	0·01	G8
C24	G.B. decoupling ...	0·5	E8
C25	Tone control ...	0·1	F7
C26*	H.T. smoothing capacitors ...	8·0	D1
C27*		16·0	D1
C28*		4·0	F6
C29‡	Aerial S.W. trim....	0·00006	H5
C30‡	Aerial M.W. trim....	0·00006	I5
C31‡	Aerial L.W. trim....	0·00006	I5
C32†	Aerial tuning ...	0·0005	A2
C33‡	Osc. M.W. track. ...	0·00006	J7
C34‡	Osc. L.W. track. ...	0·00012	H7
C35‡	Osc. S.W. trim. ...	0·00006	J7
C36‡	Osc. M.W. trim. ...	0·00006	I7
C37‡	Osc. L.W. trim. ...	0·00006	I7
C38†	Oscillator tuning ...	0·0005	A2

* Electrolytic. † Variable. ‡ Pre-set.

	RESISTORS	Values (ohms)	Location
R1	V1 hex. C.G. ...	220,000	B2
R2	V1 S.G. H.T. potential divider	12,000	H6
R3		10,000	H6
R4	Osc. stabilizer ...	100	I6
R5	V1 osc. C.G. ...	68,000	I6
R6	Osc. H.T. feed ...	22,000	I6
R7	V2 S.G. H.T. potential divider	68,000	I8
R8		150,000	I8
R9	T.I. C.G. decoup.	2,000,000	H8
R10	I.F. stopper ...	68,000	H8
R11	A.V.C. decoupling	470,000	I8
R12	Volume control ...	500,000	G5
R13	V3 C.G. resistor	4,700,000	H6
R14	Feed-back potential divider	220	G8
R15		2,200	G8
R16	V3 H.T. decoup.	150,000	G7
R17	V3 triode load ...	150,000	G8
R18	A.V.C. diode load	1,500,000	I8
R19	T.I. triode load ...	680,000	D3
R20	V4 C.G. resistor ...	340,000	F8
R21	V4 grid stopper ...	47,000	F8
R22	V4 G.B. resistor	100	F8
R23	G.B. decoupling ...	220,000	E8
R24	V1, V2 G.B., A.V.C. delay ...	33	E8
R25	Tone control ...	50,000	F5
R26	H.T. smoothing ...	1,500	G7

	OTHER COMPONENTS	Approx. Values (ohms)	Location
L1	I.F. Filter Coil ...	13.0	J8
L2	Aerial coupling coils	0.3	B1
L3		26.0	B1
L4		50.0	A1
L5	Aerial tuning coils	Very low	B1
L6		9.0	B1
L7		40.0	A1
L8	Oscillator reaction coils	21.0	J7
L9		5.0	J6
L10		7.2	I7
L11	Oscillator tuning coils	Very low	J7
L12		5.7	J6
L13		15.0	I7
L14	1st I.F. trans. Pri.	13.5	A4
L15	Sec. ...	13.5	A4
L16	2nd I.F. trans. Pri.	13.5	B4
L17	Sec. ...	13.5	B4
L18	Speech coil ...	1.4	—
L19	H.T. choke ...	52.0	C2
T1	Output trans. Pri.	75.0	E6
	Sec.	0.1	E6
T2	Mains trans. Pri., total	40.0	D2
	Heat. sec.,	0.2	D2
	Rect.heat. sec.,	0.2	D2
	H.T. sec., total	480.0	D2
S1-S12	W/band switches		J5
S13	Mains sw, g'd R12	—	G5

VALVE ANALYSIS

Valve voltages and currents given in the table below are those measured in our receiver when it was operating on mains of 222 V, using the 220 V tapping on the mains transformer. The receiver was tuned to the lowest wavelength on the M.W. band and the volume control was at maximum, but there was no signal input.

Voltages were measured on the 400 V scale of a model 7 Universal Avometer, chassis being the negative connection.

Valve	Anode Voltage (V)	Anode Current (mA)	Screen Voltage (V)	Screen Current (mA)
V1 X61M	207	1.9	80	2.6
	Oscillator			
	104	4.0		
V2 KTW61	248	5.4	60	1.6
V3 DH63	55	0.65	—	—
V4 KT61	246	30.0	207	5.0
V5 U50	252†	—	—	—
TI Y63	18	0.31	—	—
	Target			
	207	0.4		

† Each anode, A.C.

DISMANTLING THE SET

The cabinet is fitted with a detachable bottom cover, upon removal of which (two round-head wood screws and washers) access may be gained to most of the under-chassis components.

Removing Chassis.—Remove the four control knobs (recessed grub screws), and the bottom cover as previously described; withdraw the four cheese-head screws (with spring washer and two metal washers each) securing chassis to the base of the cabinet, and slide out the chassis to the extent of the connecting leads, which is sufficient for most purposes.

To free the chassis entirely, unsolder the two leads from the connecting panel on the speaker, and the single lead to the internal aerial at a tag mounted in the bottom of the speaker compartment.

Removing Speaker.—Unsolder the two leads connecting it to the chassis, and withdraw the four round-head wood screws securing it to the sub-baffle.

When replacing, the connecting panel should be at the top.

GENERAL NOTES

Switches.—S1-S12 are the waveband switches, ganged in a single 3-position rotary unit beneath the chassis. The unit is indicated in our under-chassis view, and shown in detail in the diagram in Col. 2, where it is drawn as seen when viewed from the rear of an inverted chassis.

The table (Col. 3) gives the switch positions for the three control settings, starting from the fully anti-clockwise position of the control knob. A dash indicates open, and **C**, closed.

In some chassis an unearthed shorting plate is mounted on the rotor to connect together all contacts not actually in use, but the switches so formed are omitted from our circuit diagram because they would complicate it unnecessarily. They have no bearing on the operation, but should be borne in mind when making resistance measurements.

In order to facilitate removal, the unit is mounted on a bracket set back from the front chassis member, and a stub is fitted to the end of the control spindle.

Coils.—The I.F. rejector coil **L1** is mounted beneath the chassis, close to the aerial socket. The aerial circuit coils **L2, L5, L3, L6** and **L4, L7** are in three unscreened tubular units on the chassis deck, while the oscillator circuit coils are in three similar units beneath the deck.

The I.F. transformers **L14, L15** and **L16, L17** are in two screened units on the chassis deck, their core adjustments facing the rear. A metal screening cover for **V2,** which is situated between the two units, is clamped on to the units.

Scale and Indicator Lamps.—These are three Osram lamps, with small clear spherical bulbs and M.E.S. bases, rated at 6.5 V, 0.3 A.

External Speaker.—Three sockets and a plug on a flying lead are mounted on a horizontal panel at the rear of the chassis. The two outer sockets are for the connection of a low impedance (about 2-4 Ω) external speaker, while the centre one is normally occupied by the plug. The internal speaker may be muted by withdrawing the plug.

Capacitors 26, C27.—These are two dry electrolytics in a single tubular metal container mounted on the chassis deck. Both sections are rated at 8 μF, 350 V D.C. working, but the one whose positive lead is brought out to the red tag should be used as the reservoir **(C26)** section.

Chassis Divergencies.—Our circuit shows the arrangement found in our sample chassis, but in some cases **V2** anode may be fed from the main H.T. positive line, instead of the higher-voltage point at the junction of **L19** and **R26.**

Similarly, we show the oscillator trimmers and trackers in our under-chassis view as we found them in our chassis, but the makers' diagram shows them arranged quite differently. Reading from left to right in our illustration, the arrangement they show is: 1 and 2 (in parallel), **C34;** 3, **C37;** 4, **C36;** 5, **C33** (single unit); 6, **C35.**

Their switch diagram did not agree with ours, in so far as the upper half of their diagram was reversed, the oscillator reaction coils being connected to the tags on the left-hand side (where we show **S10, S11** and **S12**), and the oscillator tuning coils to the right-hand side. This makes no difference to the action, but must be borne in mind when checking coil resistances.

C8 may comprise two units, as it did in our chassis (0.0005 μF + 0.00005 μF in parallel), and in our chassis **R20** consisted of two 680,000 Ω resistors in parallel (340,000 Ω), but this will be a single 470,000 Ω resistor where supplies are available.

Many other divergencies between the values quoted in our tables and those found in a chassis may occur, depending upon availability of desired values at the time of manufacture, but most of them are unimportant. The following are the most important divergencies from those quoted in the makers' tables.

C19 was given as 0.005 μF, instead of 0.01 μF, and **C27** was 16 μF, instead of 8 μF. **R6** was 33,000 Ω, instead of 22,000 Ω; **R8** was 220,000 Ω, instead of 150,000 Ω; **R16** and **R17** were 220,000 Ω and 470,000 Ω respectively instead of 150,000 Ω each; **R18** was 1 megohm instead of 1.5 megohms. The D.C. resistance of the I.F. transformer windings may be 8 Ω each instead of 13.5 Ω; that of **L19** may be 250.0 Ω; and **T1** primary may be 500.0 Ω.

Switch Diagram and Table

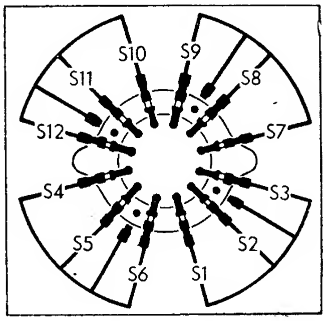
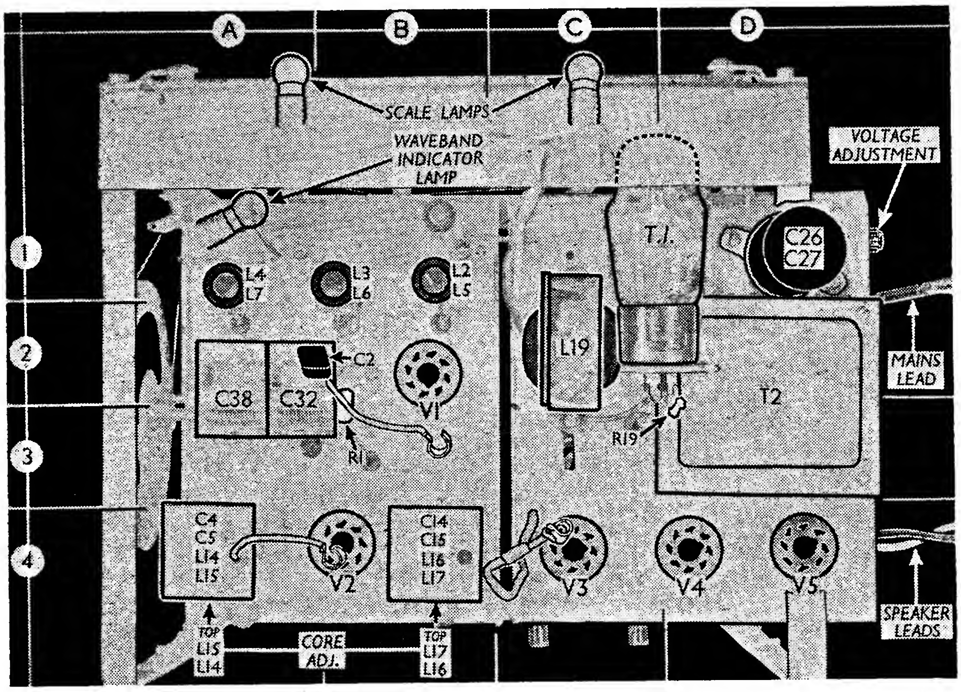


Diagram of the waveband switch unit, drawn as seen from the rear of an inverted chassis. The associated table is beside it in the next column.

Switch	S.W.	M.W.	L.W.
S1	C	—	—
S2	—	C	—
S3	—	—	C
S4	C	—	—
S5	—	C	—
S6	—	—	C
S7	C	—	—
S8	—	C	—
S9	—	—	C
S10	C	—	—
S11	—	C	—
S12	—	—	C



Plan view of the chassis. The R.F. and I.F. unit is seen on the left and the power and output unit on the right. A metal screen fits squarely over the two I.F. transformers, enclosing **V2** completely.

OTHER VERSIONS

Besides the A410A on which this *Service Sheet* is based, there are five versions of the receiver which differ in some small particular from the basic version. Their type numbers are A410B, A410C, A400, A430 and A450.

In the A410B, the H.T. smoothing choke **L19** is replaced by a 1,500 Ω resistor, and the H.T. secondary voltage of **T2** is higher than that in the A410A.

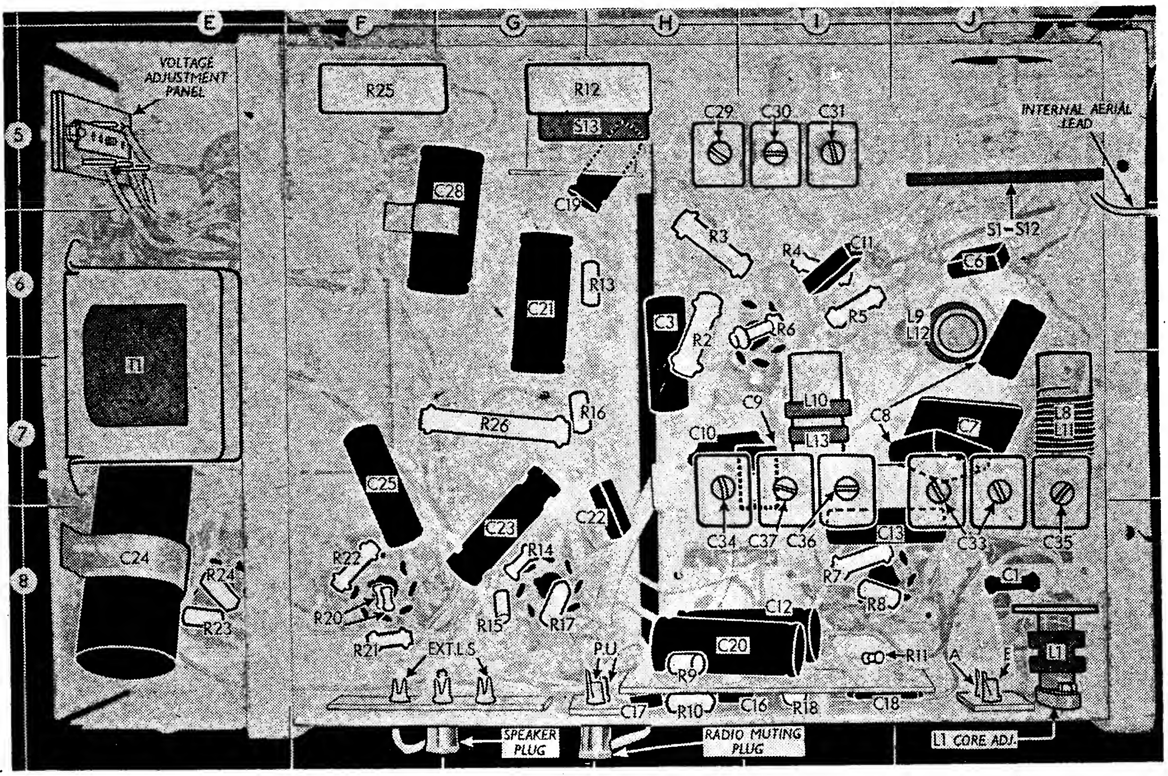
In the A410C, the speaker has an energized magnet whose field coil replaces **L19. T2** H.T. secondary voltage is again higher.

In the A400 radiogram, the A410A chassis is employed, but a 2-pole changeover switch replaces the radio muting-plug.

The A430 is a console with a 10in speaker, but otherwise it is like the A410A.

The A450 is a "Chairside" model, in which the A410A chassis is modified

Under-chassis view. The waveband switch unit **S1-S12** is indicated here and shown in detail in the diagram in Col. 2. The M.W. oscillator tracker **C33** consists of two pre-set capacitors in parallel as indicated, but the whole trimmer assembly may be differently arranged in some chassis as explained under "Chassis Divergencies" in Col. 2, where **C34** consists of two units.



mechanically to accommodate different requirements regarding control positions and scale layout. The tuning indicator is omitted.

DRIVE CORD REPLACEMENT

Ninety inches of the normal flax fishing line is required to replace the tuning drive cord, this length giving an ample margin for tying off.

The scale should be removed (5BA nuts with washers and clamps), together with top and bottom rails, and the gang should be turned to minimum capacitance, when the gang drum assumes the position shown in the sketch (Cols. 5 and 6), where the cord system is shown when completed.

Pass one end of the cord inwards through the slot in the drum groove, and tie it to the free end of the spring, then run the cord round the pulleys as shown in the sketch, taking particular care to use the correct pulley of each pair.

Finally, tie off the free end of the cord to the same end of the spring as the first end, when the tension should be sufficient to open the spring to about 1½ times its closed length, and fit the cursor as shown in the sketch.

The method of attachment to the cord is shown in the enlarged sketch inset, and is the same at each end of the cursor, which can be slid along the cord to its approximate position and finally adjusted, after replacing the scale, as explained under "Circuit Alignment." Before tightening up the four scale assembly nuts, see that the stop nuts in front of the pulleys are suitably placed.

CIRCUIT ALIGNMENT

These operations may be carried out with the chassis in the cabinet if the detachable bottom cover is removed (two round-head wood screws).

I.F. Stages.—Switch set to M.W., turn gang to minimum capacitance and volume control to maximum, connect signal generator (via an 0.1 μF capacitor) to control grid (top cap) of **V1** and the **E** socket, feed in a 465 kc/s (645.16 m) signal, and adjust the cores of **L17, L16, L15** and **L14** (location references B4, A4), in that order, for maximum output.

R.F. and Oscillator Stages.—With the gang at maximum capacitance the cursor should coincide with the high wavelength ends of the three scales. It may be adjusted in position by rotating the drive drum on the gang spindle after loosening its grub screw. Transfer "live" signal generator lead to **A** socket, via a suitable dummy aerial.

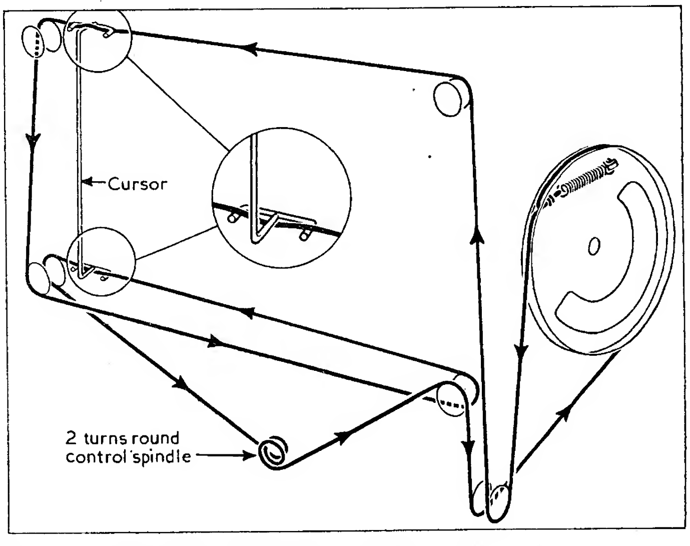
L.W.—Switch set to L.W., tune to 857 m on scale, feed in an 857 m (350 kc/s) signal, and adjust **C37** (I7) and **C31** (I5) for maximum output. Tune to 1,875 m on scale, feed in a 1,875 m (160 kc/s) signal, and adjust **C34** (H7) for maximum output. Repeat these operations.

M.W.—Switch set to M.W., tune to 200 m on scale, feed in a 200 m (1,500 kc/s) signal, and adjust **C36** (I7) and **C30** (I5) for maximum output. Tune to 500 m on scale, feed in a 500 m (600 kc/s) signal, and adjust **C33** (J7) for maximum output. Repeat these adjustments.

S.W.—Switch set to S.W., tune to 15 Mc/s on scale, feed in a 15 Mc/s (20 m) signal, and adjust **C35** (J7) and **C29** (H5) for maximum output.

I.F. Filter.—Switch set to M.W., tune to 322 m on scale, feed in a 465 kc/s (645.16 m) signal, and adjust the core of **L1** (J8) for minimum output.

Sketch showing the outline of the tuning drive system, as seen from the front right-hand corner of the chassis when the gang is at minimum. The method of attaching the ends of the cursor to the cord is shown inset in the centre of the drawing.



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